

#### ABSTRACT OF THE DISCLOSURE

A silicon oxide film is formed to cover an island non-monocrystalline silicon region by plasma CVD using an organic silane having ethoxy groups (e.g., TEOS) and oxygen as raw materials, while hydrogen chloride or a chlorine-containing hydrocarbon (e.g., trichloroethylene) of a fluorine-containing gas is added to the plasma CVD atmosphere, preferably in an amount of from 0.01 to 1 mol% of the atmosphere so as to reduce the alkali elements from the silicon oxide film formed and to improve the reliability of the film. Prior to forming the silicon oxide film, the silicon region may be treated in a plasma atmosphere containing oxygen and hydrogen chloride or a chlorine-containing hydrocarbon. The silicon oxide film is obtained at low temperatures and this has high reliability usable as a gate-insulating film in a semiconductor device.